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EXAMINER	
WONG, XAVIER S	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/663,476	JUN ET AL.	
	Examiner	Art Unit	
	Xavier Szewai Wong	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26th February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

- Claims **1** and **6** have been amended
- Claims **1** – **10** are still pending in the present application

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on *26th February 2008* has been entered.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims **1 – 3**, **6** and **8** are rejected under 35 U.S.C. 103 (a) as being unpatentable over **Chao** et al (**US 6,667,984 B1**) in view of **Angle** et al (**US 2003/0007498 A1**).

Consider claim **1**, **Chao** et al disclose a matrix switch *900* (fig. *9*) comprising: N input ports/groups *910* with a number of VOQs *912* (col. *15* lines *48-50*; col. *16* lines *7-8*); inputting into crosspoint/crossbar chips *924* (fig. *30*) and independently arbitrating input VOQ groups, and output cells (col. *16* lines *35-37*; fig. *10* item *1010*; fig. *11* items *910* & *1110*); as well as N output ports *930* for independently arbitrating cells output from the crosspoint chips *924* and transmitting cells to output ports (col. *15* lines *51-57*; col. *16* lines *18-22/31-33*; fig. *10* item *1030*; fig. *11* item *1120*); wherein the plurality of buffers store a predetermined sized cell (col. *18* lines *11-13*; fig. *12* step *1230* & item *1262*). **Chao** et al further disclose arbitration via token (credit) tunneling, which is each output port selects (accept) one winner among requesting arbitration input ports, which is in each arbitration round, a token (credit information) will be passed to a specific column (leading to a specific

output port) when a multicast bit is HIGH ("1") (col. *22* lines *11-28*; col. *23* lines *42-44*) and eventually to an output port associated with one (individual) crosspoint column (col. *22* lines *39-49*; col. *24* lines *3-17*); therefore, independently arbitrating cells. However, **Chao** et al may not have *specifically* disclosed each output port uses credit information that is status information of the corresponding buffer to independently arbitrate the cells, wherein a first output port which has a first credit value with full state of buffer does not transmit a grant signal to a first input port which sends a request signal to the first output port, and a second output port which has a second credit value with no full state of buffer selects one among second input ports which send a request signal to the second output port and transmits the grant signal to one selected second input port. **Angle** et al disclose each output port comprises an unavailability indicator (e.g. credit value) wherein the indicator may be set to 0 or 1 to indicate whether the output port will grant (no full) or will not grant (full) respectfully to a plurality input ports (fig. *4*). **Angle** et al further mention a global multicast round-robin counter (GRRC) at an output port that selects one of the input ports among input ports 0-3 based on first availability and grant the selected input port that has requested ([0064]; fig. *4* request and grant); and obviously, an output port that is marked unavailable (e.g. 1 = full) will not grant any input ports ([0083]; fig. *7A*). Therefore, **Angle** et al do read on a first output port (e.g. one of the output ports 0-3) which has a first credit value with full state (1) of buffer does not transmit a grant signal to a first input port (e.g. one of the input ports 0-3) which sends (has sent) a request signal to the first output port, and a second output port (e.g. one of the remaining three output ports other than the first one mentioned above) which has a second credit value

with no full state (0) of buffer selects one among second input ports (e.g. one of the remaining three input ports other than the first one mentioned above) which send (have sent) a request signal to the second output port and transmits the grant signal to one selected second input port. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the request-grant process of **Angle** et al to the request-grant process of **Chao** et al to more effectively perform cell scheduling of multiple class of services.

Consider claim **2**, and as applied to claim **1**, **Chao et al**, as modified by **Angle**, show the crosspoint units *926* in figure *14A* form a plurality of switch planes/modules *922* in figure *9* (col. *15* lines *54-57*); the switch module comprises output port that include buffer for storing predetermined cell in the output port (col. *16* lines *6-9*; col. *18* lines *40-49*; fig. *13* sect. *1304*).

Consider claim **3**, and as applied to claim **1**, **Chao et al**, as modified by **Angle**, disclose a switch size of "N" and "n" number of ports in each crosspoint chip/crossbar switch units; for an NxN switch (N^2) and nxn (n^2) crosspoint chips when $L^2 = N^2/n^2$, therefore, L = N/n (all natural numbers), which is the size of a group (col. *17* lines *5-10*; fig. *9* & *30*; col. *20* lines *60-63*). As an example, from figure *9*, assume there are 4 groups of VOQs *910a-d*, 4 switch modules (large squares inside *922a*), and within each switch module, there are 4 crosspoint/crossbar switch units; and therefore, L = 4.

Consider claim **6**, **Chao** et al disclose an arbitration method of a matrix switch including a plurality of input ports (fig. *9* items *910*), crosspoint/crossbar switch units (col. *18* lines *35-40*; fig. *13* items *926*), buffers (col. *18* lines *42-44*; fig. *13* sect. *1304*) wherein the plurality of buffers store a predetermined sized cell (col. *18* lines *11-13*; fig. *12* step *1230* & item *1262*), and output ports (fig. *9* items *930*) comprising:

(a) a grant arbiter of the crosspoint unit selects (inherently after searching) a winning first-requested request from input signals of the input ports (col. *18* lines *18-23*; fig. *11* items *1110* & *1120*)

(b) input arbiter sends request to output/grant arbiter to determine whether a (additional) head-of-line cell of a VOQ buffer can be granted for output at output port (col. *16* lines *12-13*/*34-45*; col. *20* lines *31-46*); further, **Chao et al** teach arbitration via token (credit) tunneling, which is each output port selects (accept) one winner among requesting arbitration input ports, which is in each arbitration round, a token (credit information) will be passed to a specific column (leading to a specific output port) when a multicast bit is HIGH ("1") (col. *22* lines *11-28*; col. *23* lines *42-44*) and eventually to an output port associated with the one (individual) crosspoint column (col. *22* lines *39-49*; col. *24* lines *3-17*); therefore, using credit token to determine whether grant arbiter can received more cells for the specified output port

(c) output arbiter sends grant signal to input/accept arbiter when a cell is buffered (col. *16* lines *56-57*; col. *18* lines *16-23*)

(d) input arbiter (as accept arbiter) of crosspoint unit perform arbitration to select a (first) grant signal from a multiple set of grant signals (col. *16* lines *57-59*; fig. *9* item *920*)

(e) input arbiter sends accept signal to winning output according to grant signal (col. *16* lines *59-60*).

However, **Chao** et al may not have *specifically* disclosed each output port uses credit information that is status information of the corresponding buffer to independently arbitrate the cells, wherein a first output port which has a first credit value with full state of buffer does not transmit a grant signal to a first input port which sends a request signal to the first output port, and a second output port which has a second credit value with no full state of buffer selects one among second input ports which send a request signal to the second output port and transmits the grant signal to one selected second input port. **Angle** et al disclose each output port comprises an unavailability indicator (e.g. credit value) wherein the indicator may be set to 0 or 1 to indicate whether the output port will grant (no full) or will not grant (full) respectfully to a plurality input ports (fig. *4*). **Angle** et al further mention a global multicast round-robin counter (GRRC) at an output port that selects one of the input ports among input ports 0-3 based on first availability and grant the selected input port that has requested ([0064]; fig. *4* request and grant); and obviously, an output port that is marked unavailable (e.g. 1 = full) will not grant any input ports ([0083]; fig. *7A*). Therefore, **Angle** et al do read on a first output port (e.g. one of the output ports 0-3) which has a first credit value with full state (1) of buffer does not transmit a grant signal to a first input port (e.g. one of the input ports 0-3) which sends a request signal to the first output port, and a second output port (e.g. one of the remaining three output ports other than the first one mentioned above) which has a second credit value with no full state (0) of buffer selects one among second input ports (e.g. one

of the remaining three input ports other than the first one mentioned above) which send a request signal to the second output port and transmits the grant signal to one selected second input port. It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the request-grant process of **Angle** et al to the request-grant process of **Chao** et al to more effectively perform cell scheduling of multiple class of services.

Consider claim **8**, and as applied to claim **6**, **Chao** et al, as modified by **Angle** et al, further disclose the utilization of *dual* Round Robin to selecting/searching winning (therefore, highest priority) value in grant, accept and output arbitrations in steps *a*, *d* and *f* (col. *16* lines *22-33*; fig. *11* items *1110*,*1120*; *abstract*).

7. Claim **4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao** et al (**US 6,667,984 B1**) in view of **Angle** et al (**US 2003/0007498 A1**), as applied to claim **3**, and in further view of **Wang** et al (**US 2004/0083326 A1**).

Consider claim **4**, and as applied to claim **3**, **Chao** et al, as modified by **Angle** et al, disclose *n = 4* output and input arbiters (with grant and accept capabilities respectively – col. *16* lines *46-60*) for 4 groups of input ports, each with *n = 4* VOQs in figure *11* and crosspoint units are controlled by input/output port controllers (col. *20* lines *21-33*). However, **Chao** et al do not specifically disclose the grant arbiter receives n-bit request signal vector from VOQ and transmits an n-bit grant signal vector to the accept arbiter; and the accept arbiter receives the n-bit grant signal vector, and transmits an n-bit accept signal vector to the crossbar switch controller. **Wang** et al disclose in figure *3* a

group of VOQs sending N-bit request (signal) vector to a grant arbiter inside a scheduler (as controller) of a crossbar switch and an N-bit grant (signal) vector to an accept arbiter (paragraphs *0047* lines *1-16* & *0050*; *abstract*); the accept arbiter then transmit the N-bit accept vector to decision register (paragraph *0048*; fig. *4*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings as taught by **Wang** et al, in the matrix switch of **Chao** et al, as modified by **Angle** et al, to specifically tell whether a corresponding egress port sent a grant to a specific ingress port.

8. Claims **5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao** et al (**US 6,667,984 B1**) in view of **Angle** (**US 2003/0007498 A1**) and **Wang** et al (**US 2004/0083326 A1**), as applied to claim **4**, and in further view of **Van Wageningen** et al (**US 2002/0150121 A1**).

Consider claim **5**, and as applied to claim **4**, **Chao** et al, as modified by **Angle** et al and **Wang** et al, disclose both input and output controls comprise queue management process (fig. *12* item *1250*; fig. *15* item *1520*) to send request signals to output arbitration/arbiter when a cell is in line in figure *11* item *1120* (col. *20* lines *9-24*). However, **Chao** et al, as modified by **Angle** et al and **Wang** et al, may not have specifically mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen** et al disclose an output arbiter takes in a selected route identifier to decide which inquiries to be accepted and forward selected route (accept) identifier to a switching (crossbar) matrix to inform acceptance (paragraphs *0042-43*; fig. *2*: items *7* switching controller → *6* crossbar switch matrix, fig. *4* item *13* = output arbiter in

switching controller *7*). It would have been obvious to one of ordinary skill in the art to implement the output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen** et al to the output arbiter **Chao** et al, as modified by **Angle** et al and **Wang** et al, for selective output grants based on inquiries from a plurality of inputs.

9. Claims **7** and **9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (**US 6,667,984 B1**) in view of **Angle** et al (**US 2003/0007498 A1**), as applied to claims **6** and **8**, and in further view of **Van Wageningen** et al (**US 2002/0150121 A1**).

Consider claim **7**, and as applied to claim **6**, **Chao et al** disclose output arbitration/arbiter process for each output port uses the crosspoint units to select the winning (highest priority) "first" request signal (col. *17* lines *39-55*). However, **Chao** et al may not have specifically mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen** et al disclose an output arbiter takes in a selected route identifier to decide which inquiries to be accepted and forward selected route (accept) identifier to a switching (crossbar) matrix to inform acceptance (paragraphs *0042-43*; fig. *2*: items *7* switching controller → *6* crossbar switch matrix, fig. *4* item *13* = output arbiter in switching controller *7*). It would have been obvious to one of ordinary skill in the art to implement the output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen** et al to the output arbiter **Chao** et al, as modified by **Angle** et al, for selective output grants based on inquiries from a plurality of

inputs.

Consider claim **9**, and as applied to claim **8**, **Chao** et al further disclose updating (new/greater) highest priority of selected output port from input arbitration/arbiter (as accept arbiter) based on a grant signal as well as updating crosspoint units on highest priority and stores values in a column priority value register – CPR (col. *16* lines *41-57*; col. *31* lines *40-63*; col. *32* lines *60-67*). However, **Chao** et al may not have specifically mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen** et al disclose an output arbiter takes in a selected route identifier to decide which inquiries to be accepted and forward selected route (accept) identifier to a switching (crossbar) matrix to inform acceptance (paragraphs *0042-43*; fig. *2*: items *7* switching controller → *6* crossbar switch matrix, fig. *4* item *13* = output arbiter in switching controller *7*). It would have been obvious to one of ordinary skill in the art to implement the output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen** et al to the output arbiter **Chao** et al, as modified by **Angle** et al, for selective output grants based on inquiries from a plurality of inputs.

10. Claim **10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao** et al (**US 6,667,984 B1**) in view of **Van Wageningen** et al (**US 2002/0150121 A1**), as applied to claim **9**, and in further view of **McKeown** (*"The iSLIP Scheduling Algorithm for Input-Output Switches"*).

Consider claim **10**, and as applied to claim **9**, **Chao** et al, as modified by **Van Wageningen** et al, disclose the claimed invention except specifically mentioning an accept arbiter updating a preset highest priority ranking value by adding 1 to output port information matched with a grant signal, and the accept arbiter updating the highest priority ranking adding 1 to input port information and crossbar switch unit information corresponding to an accept signal. **McKeown** disclose an accept arbiter increments by one a (preset) highest priority (ranking) value with pointers g_i (grant) and a_i (accept) to an output matched with a grant signal; also to input and a crossbar switch unit (pg. *199* left-col. *steps 2* & *3* in *IX. Implementing iSLIP*; pg. *196* left-col. steps *2* & *3*; fig. *20* & *21*). It would have been obvious to one of ordinary skill to incorporate the teachings as taught by **McKeown**, in the method of **Chao et al**, as modified by **Van Wageningen et al**, for achieving the same goal.

Response to Arguments

11. Applicant's arguments with respect to claims **1** and **6** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Alasti et al (**US 7,170,903 B2**) teach an apparatus for arbitrating for a switch fabric having a plurality of ports, each port from the plurality of ports having its own plurality of links to determine, on a per port basis, a subset of links from the plurality of links associated with that port, each link from the determined subset of links for that port

being associated with a candidate packet, each link from the plurality of links for that port being associated with a weight value; select, on a per port basis, a link from the determined subset of links for that port based on the weight value for determined subset of links for that port; determine if any of the plurality of links unassociated with the candidate packet has a corresponding weight value greater than the weight value of the link; and if the corresponding weight value is greater than the weight value of the link, then the method includes, decrease the corresponding weight value

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xavier Wong whose telephone number is 571-270-1780. The examiner can normally be reached on Monday through Friday 8:30 am - 6:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Seema S. Rao/
Supervisory Patent Examiner,
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X.S.W / x.s.w
1st May 2008